

Dimmock and Primrose, *Introduction to Modern Virology*, Blackwell Scientific Publications, Oxford, England, 1987

identify, and where possible to eliminate, vectors and reservoirs of the disease. Thus virus yellows in British sugar-beet crops can be largely controlled by removing weeds, mangold clumps and old beet crops which serve as overwintering reservoirs of both the virus and its aphid vector. In the past relatively little attention has been paid to the ecology of viruses not directly affecting man but this situation is clearly changing for reasons best exemplified by the baculoviruses.

Insect viruses

More than 600 viruses have been isolated from dead or moribund insects although very few have been studied in detail. Since only a small proportion—probably less than 1%—of the total number of insect species have been examined many more viruses of insects remain to be discovered. Of the eight groups of insect viruses described so far only the baculoviruses appear to be restricted to insects and because of their specificity they have been considered as biological control agents. Most of the insect pests of world-wide importance in agriculture and forestry are members of the Lepidoptera and Hymenoptera and it is fortunate that baculoviruses are commonly found in species in these groups. Such viruses can cause epizootics in their host population to such a level that very effective natural control is exerted. For example, in recent years large areas of effective natural control have been exerted. For example, in recent years large areas of spruce in Wales were attacked by the spruce sawfly. Previously, the sawfly had only been a local pest and the reasons for the widespread population growth are not clear. However, in 1973 a baculovirus was observed to be causing considerable mortality of the sawfly and by 1976 effective natural control had been established.

It is significant that when baculovirus preparations have been applied to insect populations in the field, the degrees of mortality, and therefore control, have been extremely variable. Unfortunately, the reasons for success or failure in such applications are not fully understood and are obviously a hindrance to further development, but the dose of baculovirus administered, its retention of infectivity and the state of the insect host are important factors.

In any introduction into the environment of pathogenic insect viruses great care must be taken to assess the ecological dangers. The potential for accidental infection of invertebrates or vertebrates with the possibility of overt disease or, more insidiously, widespread inapparent infections are both